minimum measured ac impedance, as defined in paragraph (b)(1)(iv) of this section, during the application of simulated ringing as listed in Table 68.312(a).

(2) For individual equipment intended for operation on ground-start telephone facilities, the ringer equivalence is five times the impedance limitation listed in Table 68.312(a), divided by the minimum measured ac impedance, defined in paragraph (c)(2) of this section, during the application of simulated ringing as listed in Table 68.312(a).

(e) *Ringer equivalence number labeling.* Registered terminal equipment and registered protective circuitry shall have at least one Ringer Equivalence Number shown on the registration label. Where options that will vary the Ringer Equivalence are involved, either each option that results in a Ringer Equivalence Number greater than 0.1 and its corresponding Ringer Equivalence shall be listed on the registration label, or the largest Ringer Equivalence Number that can result from such options shall be stated on the label. A trained, authorized agent of the Grantee may disconnect ringers, bridge ringers to another line, or execute options affecting Ringer Equivalence after the telephone company has been notified in accordance with §68.106.

(f) *Maximum ringer equivalence.* All registered terminal equipment and registered protective circuitry that can affect the ringing frequency impedance shall be assigned a Ringer Equivalence. The sum of all such Ringer Equivalences on a given telephone line or loop shall not exceed 5. In some cases, a system that has a total Ringer Equivalence of 5 or less may not be usable on a given telephone line or loop.

(g) *OPS interfaces for PBX with DID (Ring trip requirement).* PBX ringing supplies whose output appears on the off-premises interface leads shall not trip when connected to the following tip-to-ring impedance that terminates the off-premises station loop: A terminating impedance composed of the parallel combination of a 15 kohms resistor and an RC series circuit (resistor and capacitor) whose ac impedance is as specified in Table 68.312(b) below.

TABLE 68.312(b)

Ringing freq Hz	ac impedance ohms	
	Class B or C	Class A
20 ± 3	7000/N	1400
30 ± 3	5000/N	1000

N—Number of ringer equivalences, as specified by the manufacturer, which can be connected to the off-premises station loop.

(h) *Type Z Ringers.* Equipment that has on-hook impedance characteristics which do not conform to the requirements of this section may be conditionally registered, notwithstanding the requirements of this section, provided that it is labeled with a Ringing Type designation ''Z''. It should be noted that registration of equipment bearing the designation ''Z'' does not necessarily confer any right of connection to the telephone network under these rules. Any equipment registered with the type Z designation may only be used with the consent of the local telephone company, provided that the local telephone company does not discriminate in its treatment of equipment bearing the type Z designation.

(i) *Transitioning to the Off-Hook State.* Registered terminal equipment and registered protective circuitry shall not by design leave the on-hook state by operations performed on tip and ring leads for any other purpose than to request service or answer an incoming call, except that terminal equipment that the user places in the off-hook state for the purpose of manually placing telephone numbers in internal memory for subsequent automatic or repertory dialing shall be registerable. Make-busy indications shall be transmitted by the use of make-busy leads only as defined in §68.3 and §68.200(j).

[62 FR 61689, Nov. 19, 1997]

§68.314 Billing protection.

(a) *Call duration requirements on data equipment connected to the public switched network, or to tie trunks, or to private lines that access the public switched network.* Registered data terminal equipment and registered protective circuitry shall comply with the following requirements when answering an incoming call, except in off-hook states in which the signals are

transmitted and/or received by electroacoustic transducers only.

NOTE TO PARAGRAPH (a) OF THIS SECTION: This paragraph is applicable to terminal equipment and registered protective circuitry employed with digital services where such digital services are interconnected with the analog telephone network.

(1) *Registered protective circuitry*. Registered protective circuitry connected to associated data equipment shall assure that the following signal power limitations are met for at least the first 2 seconds after the off-hook condition is presented to the telephone network in response to an incoming call:

(i) Signals that appear at the protective circuitry/telephone network interface for delivery to the telephone network shall be limited to -55 dBm, (at any frequency in the range of 200 to 3200 Hertz), as such signals are delivered into a loop simulator circuit or a 600 ohm termination, as appropriate; and

(ii) Signals that appear at the protective circuitry-associated data equipment interface for delivery to associated data equipment shall be limited as follows: for any received signal power (appearing at the protective circuitry-telephone network interface) up to 0 dB with respect to one milliwatt (at any frequency in the range of 200 to 3200 Hertz), the power of signals delivered to associated data equipment shall be no greater than the signal power that would be delivered as a result of received signal power of -55 dBm.

(2) *Registered terminal equipment.* Registered terminal equipment for data applications shall assure that, when an incoming telephone call is answered, the answering terminal equipment prevents both transmission and reception of data for at least the first two seconds after the answering terminal equipment transfers to the off-hook condition. For the purpose of this requirement, a fixed sequence of signals that is transmitted (and originated within) and/or received by the registered terminal equipment each time it answers an incoming call shall not be considered data, provided that such signals are for one or more of the following purposes:

(i) Disabling echo control devices,

(ii) Adjusting automatic equalizers and gain controls,

(iii) Establishing synchronization, or

(iv) Signaling the presence and if required, the mode of operation, of the data terminal at the remote end of a connection.

(b) *Voice and data equipment on-hook signal requirements for equipment connected to the public switched network, or to tie trunks, or to private lines that access the public switched network.* Registered protective circuitry and registered terminal equipment shall comply with the following:

(1) The power delivered into a 2-wire loop simulator circuit or into the transmit and receive pairs of a 4-wire loop simulator or into a 600 ohm termination (where appropriate) in the on-hook state, by loop-start or ground-start equipment shall not exceed −55 dBm within the voiceband. Registered protective circuitry shall also assure that for any input level up to 10 dB above the overload point, the power to a 2-wire loop simulator circuit or the transmit and receive pairs of a 4-wire loop simulator circuit or into a 600 ohm termination (where appropriate) does not exceed the above limits.

(2) The power delivered into a 2-wire loop simulator circuit or into the transmit and receive pairs of a 4-wire loop simulator circuit, in the on-hook state, by reverse battery equipment shall not exceed −55 dBm, unless the equipment is arranged to inhibit incoming signals.

(c) *Voice and data equipment loop current requirements for equipment connected to the public switched network.* The loop current through registered terminal equipment or registered protective circuitry, when connected to a 2-wire or 4-wire loop simulator circuit with the 600 ohm resistor and 500 microfarad capacitor of the 2-wire loop simulator circuit or both pairs of the 4-wire loop simulator circuit disconnected shall, for at least 5 seconds after the equipment goes to the off-hook state that would occur when answering an incoming call:

(1) Be at least as great as the current obtained in the same loop simulator circuit with minimum battery voltage and a maximum loop resistance when a 200 ohm resistance is connected across

the tip and ring of the 2-wire loop simulator circuit or connected across the tip/ring and tip 1/ring 1 conductors (tip and ring connected together and tip 1 and ring 1 connected together) of the 4-wire loop simulator circuit in place of the registered terminal equipment or registered protective circuitry; or

(2) Not decreased by more than 25 percent from its maximum value attained during this 5-second interval; unless the equipment is returned to the on-hook state during the above 5 second interval.

(3) The above requirements also apply in the hold state and any off-hook state.

(d) *Signaling interference requirements.* (1) The signal power delivered to the network interface by the registered terminal equipment and from signal sources internal to registered protective circuitry in the 2450 Hz to 2750 Hz band shall be less than or equal to the power present simultaneously in the 800 Hz to 2450 Hz band for the first 2 seconds after going to the off-hook state.

(2) Registered terminal equipment for connection to subrate or 1.544 Mbps digital services shall not deliver digital signals to the telephone network with encoded analog content energy in the 2450 to 2750 Hertz band unless at least an equal amount of encoded analog energy is present in the 800 to 2450 Hertz band for the first two seconds after going to the off-hook state.

(e) *On-hook requirements for registered terminal equipment for connection to subrate and 1.544 Mbps digital services.* Registered terminal equipment and registered protective circuitry shall comply with the following:

(1) The power delivered to the telephone network in the on-hook state as derived by a zero level decoder shall not exceed −55 dBm equivalent power for digital signals within the voiceband.

(2) Registered protective circuitry shall also assure that the power to a zero level decoder does not exceed the above limits for any input level up to 10 dB above the overload point.

(3) Reverse battery interface. The power derived by a zero level decoder, in the on-hook state, by reverse battery equipment, shall not exceed −55 dBm, unless the equipment is arranged to inhibit incoming signals.

(f) *Off hook requirements.* Off-hook signal requirements for registered terminal equipment connecting to 1.544 Mbps digital services. Upon entering the normal off-hook state, in response to alerting, for subrate channels, registered terminal equipment shall continue to transmit the signaling bit sequence representing the off-hook state for 5 seconds, unless the equipment is returned to the on-hook state during the above 5-second interval.

(g) *Operating requirements for direct inward dialing.* (1) For registered terminal equipment, the off-hook state shall be applied within 0.5 seconds of the time that:

(i) The terminal equipment permits the acceptance of further digits that may be used to route the incoming call to another destination.

(ii) The terminal equipment transmits signals towards the calling party, except for the call progress tones, *i.e.,* busy, reorder and audible ring, and the call is:

(A) Answered by the called, or another station;

(B) Answered by the attendant;

(C) Routed to a customer controlled or defined recorded announcement, except for ''number invalid,'' ''not in service'' or ''not assigned;''

(D) Routed to a dial prompt; or

(E) Routed back to the public switched telephone network or other destination and the call is answered. If the status of the answered call cannot be reliably determined by the terminal equipment through means such as, detection of answer supervision or voice energy, removal of audible ring, etc., the off-hook state shall be applied after an interval of not more than 20 seconds from the time of such routing. The off-hook state shall be maintained for the duration of the call.

(2) For registered protective circuitry:

(i) Registered protective circuitry shall block transmission incoming from the network until an off-hook signal is received from the terminal equipment.

(ii) Registered protective circuitry shall provide an off-hook signal within 0.5s following the receipt of an off-hook

signal from the terminal equipment and shall maintain this off-hook signal for the duration of the call.

[62 FR 61690, Nov. 19, 1997]

§68.316 Hearing aid compatibility: Technical requirements.

A telephone handset is hearing aid compatible for the purposes of this section if it complies with the following standard, published by the Telecommunications Industry Association, copyright 1983, and reproduced by permission of the Telecommunications Industry Association:

ELECTRONIC INDUSTRIES ASSOCIATION RECOMMENDED STANDARD RS–504 MAGNETIC FIELD INTENSITY CRITERIA FOR TELEPHONE COMPATIBILITY WITH HEARING AIDS

[Prepared by EIA Engineering Committee TR–41 and the Hearing Industries Association's Standards and Technical Committee]

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Magnetic Field Intensity Criteria for Telephone Compatibility With Hearing Aids

(From EIA Standards Proposal No. 1652, formulated under the cognizance of EIA TR–41 Committee on Voice Telephone Terminals and the Hearing Industries Association's Standards and Technical Committee.)

1 Introduction

Hearing-aid users have used magnetic coupling to enable them to participate in telephone communications since the 1940's. Magnetic pick-ups in hearing-aids have provided for coupling to many, but not all, types of telephone handsets. A major reason for incompatibility has been the lack of handset magnetic field intensity requirements. Typically, whatever field existed had been provided fortuitously rather than by design. More recently, special handset designs, e.g., blue grommet handsets associated with public telephones, have been introduced to provide hearing-aid coupling and trials were conducted to demonstrate the acceptability of such designs. It is anticipated that there will be an increase in the number of new handset designs in the future. A standard definition of the magnetic field intensity emanating from telephone handsets intended to provide hearing-aid coupling is needed so that hearing-aid manufacturers can design their product to use this field, which will be guaranteed in handsets which comply with this standard.

1.1 This standard is one of a series of technical standards on voice telephone terminal equipment prepared by EIA Engineering Committee TR–41. This document, with its companion standards on Private Branch Exchanges (PBX), Key Telephone Systems (KTS), Telephones and Environmental and Safety Considerations (Refs: A1, A2, A3 and A4) fills a recognized need in the telephone industry brought about by the increasing use in the public telephone network of equipment supplied by numerous manufacturers. It will be useful to anyone engaged in the manufacture of telephone terminal equipment and hearing-aids and to those purchasing, operating or using such equipment or devices.

1.2 This standard is intended to be a living document, subject to revision and updating as warranted by advances in network and terminal equipment technology and changes in the FCC Rules and Regulations.

2 Scope

2.1 The purpose of this document is to establish formal criteria defining the magnetic field intensity presented by a telephone to which hearing aids can couple. The requirements are based on present telecommunications plant characteristics at the telephone interface. The telephone will also be subject to the applicable requirements of EIA RS–470, Telephone Instruments with Loop Signaling for Voiceband Applications (Ref: A3) and the environmental requirements specified in EIA Standards Project PN–1361, Environmental and Safety Considerations for Voice Telephone Terminals, when published (Ref: A4).

Telephones which meet these requirements should ensure satisfactory service to users of magnetically coupled hearing-aids in a high percentage of installations, both initially and over some period of time, as the network